Mr. Hollingworth "On the Chinese Game of Chess," Mr. Forrest (acting Consul at Ningpo) "On the Christianity of Hung Tsiu Tsuen, being a Review of Taeping Books," and the Rev. S. R. Brown's translation of a curious old Japanese manuscript entitled "Annals of the Western Ocean." The last-named article is one of singular interest in many respects. It is divided into three parts, the first of which contains an account of the arrest of a Roman Catholic priest upon an island called Yaku-Shirna in the year 1708, his removal to Nagaski and examination there, and his subsequent arrival at Yeddo, imprisonment, trial, and death. The name of the person as given in Japanese syllables was Jean Baptista Shirotte, and he is supposed to have been the last Roman Catholic missionary who landed in Japan previous to the year 1859. The second part contains the report of the prisoner's examination, and the information obtained from him respecting the military and naval power, and the wars and conquests of the Western nations; while the third comprises the missionary's answers to the questions put to him about himself and his family connections, his reason for coming to Japan, and his religious creed.

From the very curious paper on the "Birds and Beasts of Formosa" which is translated by Mr. Swinhoe, H.B.M. Council at Taiwan, from the 18th chapter of the "*Tai-wan-foo-che*, or Statistics of Taiwan," we learn that "as soon as the doe that has finished suckling observes her roe getting to maturity, she deserts it and repairs to other hills, fearing that her young might entertain an improper affection for herself. Animals do not confuse the laws of consanguinity, the horse excepted. The doe deprives her offspring of any such opportunity by setting a distance between herself and her young." We have quoted this passage because it contains almost the identical views expressed by Aristotle,* but we suspect that this idea is not based on any sound foundation.

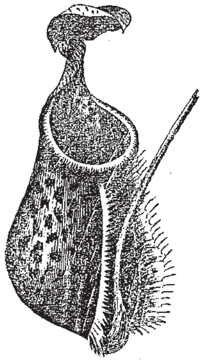
Several of the articles, and especially those of Dr. Henderson "On the Medicine and Medical Practice of the Chinese," and of Mr. Walters "On Chinese Notions about Pigeons and Doves," throw considerable light on the absurd mode of practice adopted by the native doctors. From the latter paper we learn that the eggs of pigeons are an antidote to the injurious effects of boils and smallpox. Some persons may think the remedy worse than the disease, as the following course has to be followed:—Two eggs must be hermetically sealed in a bamboo tube and placed in the middle of a cesspool for half a moon. The whites are then to be mixed with three ounces of *shen-sha*, a very fine red sand-like substance, and the compound is to be divided into pills of the size of a green pea. If thirty of these pills are taken three times a day, the patient will soon find relief, for the poisonous matter will be rapidly discharged by the bowels and kidneys. The excrement of the same bird, when roast to cinder and soaked in wine, forms a cure for cold on the chest, and there are several other affections in which it is very useful. Let us conclude with a pleasanter remedy. "Of the *shi-chin* or wood-pigeon it is written that its flesh is sweet, delicate, and without poison. It also gives one a composed mind, and enables him to do with little sleep. Its foot and leg bones have the very delightful quality of exciting affection between husband and wife. If on the fifth day of the fifth moon the husband takes one of these bones and the wife takes one, each putting the bone in a basin of water, one from the left and the other from the right side, the two bones will come together and float together, thus indicating a long and happy union to the parties trying the experiment."

G. E. D.

OUR BOOK SHELF

A Manual of Structural Botany for the Use of Classes, Schools, and Private Students. By M. C. Cooke. New Edition. (London: R. Hardwicke.)

We have so often felt it our duty to expose the incompetence of those who attempt to write elementary text-books of science, that it is a real pleasure to come upon one like Mr. Cooke's "Manual of Botany," where a man of really accurate scientific knowledge applies himself to writing an elementary work on the rudiments of his science. The special object of the publication, as stated in the preface, is to supply a cheap manual to place in the hands of students in the Botanical Classes established for operatives in connection with the Department of Science and Art; but it may well be used as a first book to prepare for other objects, as, for instance, for the first B.Sc. examination, or that for Women, at the University of London, though it would then have to be supplemented by others on the systematic branch of the subject. The descriptions are clear and accurate, and expressed in commendably terse language. It is illustrated by over two hundred woodcuts, some of them of decided merit; and we have reserved our crowning sentence of commendation till the last—the price is one shilling! A. W. B.


Pitcher of Nepenthes

Geographisches Jahrbuch. III. Band, 1870. Unter Mitwirkung von A. Anvers, J. Baeyer, A. Fabricius, A. Griesbach, Fr. Müller, Fr. Neumann, L. K. Schmarda, F. R. Seligmann, J. Spörer, H. Wagner:—Herausgegeben von E. Behm, Mitredakteur von Petermann's Geogr. Mittheilungen, 1870. (Gotha: Perthes. London: Williams and Norgate.)

We lately had occasion to speak in terms of high commendation of Vivien de St. Martin's *Année Géographique*, and we can award equal praise to Behm's corresponding work, which is the more elaborate of the two, and consequently the less agreeable to the ordinary reader. It is divided into four parts, devoted respectively to Geographical Chronology, Geographical Statistics, Essays on the Progress of Geographical Knowledge, and Tables of use in Mathematical Geography. The first part consists of a geographical calendar, stating the date of the discoveries of various countries, of the birthdays and deaths of great geographers, &c. (for example, on the day on which we are now writing, April 22nd, J. Richer arrived at Cayenne, 1672; the island of Rea or Wallis was discovered by Maurelle, 1781; Reao was discovered by Duperry, 1822; Denham arrived at India (Mandara) 1823; and the *Novara* sailed from Singapore, 1858); and it treats of the manner in which time is calculated in certain countries. The second part is extremely valuable, but is very dull; any information that may be required as to the state of the population of any country, of the number of houses and inhabitants in a square mile, &c., may be readily found here. The third part consists of extremely

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* See his "History of Animals," Book ix.. chap. 34 (Creswell's Translation in Bohn's *Scientific Series*), in which he tells two very remarkable stories regarding a camel and a stallion in relation to this subject.

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valuable memoirs by Baeyer, on the progress lately made in the measurement of the degree; by Griesbach, on the Geography of Plants; by Schmarda, on the progress of our Knowledge of the Distribution of Animals; by Seligmann, on the Progress of Ethnology; by Müller, on Linguistic Ethnography in Relation to Anthropology; by Fabricius, on the Progress of our Knowledge of National Statistics; by Spörer, on the History of Geography; by Neumann, on the Products, Merchandise, and Currency of Different Nations; and by Behm, on the most important Geographical Travels during the years 1868-69. Behm's memoir, which extends over more than a hundred pages, is unquestionably the most valuable portion of the book, and next in order of interest, at all events to the naturalist, we should place the essays of Schmarda and Griesbach. The last part of the volume is purely numerical, and requires no comment. Everyone desirous of keeping himself up to the existing level of geographical knowledge should purchase both the German and French annuals. For those who must content themselves with a single volume, we should say the French one was the better.

G. E. D.

The Romance of Motion. By Alec Lee. (Longmans: 1871.)

THIS is another of those books in which the author does not understand the first principles of the science with which he deals. The laws of motion seem to be affording more than usual trouble to certain people just now, and most unfortunately they write books about it couched in the longest scientific terms and the most formidably accurate-looking phraseology. The author alleges, as one of the extraordinary paradoxes among the opinions of the nineteenth century, "how all bodies are supposed to persevere in their state of rest or of motion, in a straight line, unless compelled to change that state of rest or motion by the impression of some force on them; and how, in opposition to this law, the planets become accelerated and retarded in their orbits without such adequate impression of force; also how bodies initially projected at the surface of the earth, fall by the force of gravitation with velocities uniformly accelerated, and how the planets similarly projected descend towards the sun with velocities comparatively equal throughout the entire duration of their revolutions." We need hardly remind the reader that these conclusions, so far from being in any way in *opposition to* the law of motion stated by the author, are in complete harmony with that law, and, as was demonstrated by Newton, follow from it on the hypothesis (to give it no higher name) of gravitation. The author at least might have observed, in comparing the case of the stone and of the planet, that the direction of the force on the former is unaltered, while that of the force on the latter is continually changing.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his Correspondents. No notice is taken of anonymous communications.*]

Thickness of the Earth's Crust

ARCHDEACON PRATT's explanation in NATURE of May 11 seems to assume that a rigid body moving in contact with a fluid body can never communicate its own rate of motion to the latter as quickly as it would do if this were also a rigid body attached to itself. Supposing the earth to consist of a rigid crust inclosing a fluid interior, and the crust to be moved by the forces producing precession, it would, he says, "slip over the surface of the revolving fluid through a small space proportionate to the push given to the poles. The fluid could not possibly acquire in an instant this new motion, however small it might be, because the fluid is not rigidly connected with the crust."

I venture to suggest that if in the last sentence Mr. Pratt would substitute the word "slow" for "small," the question would have a different aspect, notwithstanding his subsequent statement to the contrary.

Strictly speaking, when a body, however rigid, is moved, the whole of it never moves instantaneously. The particles on which the moving force immediately acts move first, and the rest move in succession afterwards. The smallness of the interval is the measure of the rigidity, but some interval must always be assumed. Bodies move as a whole through the attractive or repulsive forces of their particles; and every such force resolves itself into a power of moving something through a certain space in a certain time. The reason why a moving solid will "slip over" the surface of a fluid instead of carrying it with it, is that the rate at which it can carry it with it by reason of its attractive force is commonly less than the rate at which the solid is moving. But if the motion is slow enough to exceed that which the attractive force will cause in the fluid, it will slip over no longer; and if it be so slow that not only the power of the solid over the fluid, but of the fluid particles over each other, is able to produce an equal rate of motion, the whole mass will move together as if it were a rigid body. This rate will depend chiefly on the nature of the fluid. If a metal plate four inches in diameter is filled with lamp oil, and made to rotate at about one revolution in three minutes, the oil will move with the plate without appreciable retardation, though if the speed be doubled, the oil is seen to be "slipped over." If water is used, or the size increased, the rotation must of course be very much slower. It would appear on these grounds, I think, that the extremely slow movement of precession might practically affect the whole body of the earth as if it were rigid, notwithstanding the granting of a fluid interior.

May 14 A. J. M.

IT requires no little courage to attack so eminent a mathematician as Archdeacon Pratt on his own ground, and it is, therefore, with the utmost diffidence that I venture to suggest that in his defence of Hopkins against Delaunay in your last number, he has mistaken a mathematical fiction for a fact.

In calculations involving quantities which vary in magnitude, the imperfection of our methods oblige us to have recourse to an artifice, and for the benefit of the non-mathematical reader, I will try to explain what this artifice is, taking the case of nutation as an example:—

The motion of the earth's axis which is known by this name, is caused mainly by the attraction of the moon on that part of the earth which lies outside a sphere, whose centre is the earth's centre, and its radius the polar radius of the earth. Now this force of the moon's attraction is never the same in magnitude; and, however small be the interval of time we consider, it is not the same at the end as the beginning of that interval; it is incessantly changing. Everyone will realise the difficulty of estimating the effect of such a force. This difficulty is got over by the artifice I mentioned, which is as follows:—The time is divided into a number of small intervals, and the attraction is supposed to keep during anyone of these intervals the magnitude which it has at the beginning of that interval, and at the end of that interval *suddenly* to assume the magnitude which it has at the beginning of the interval next following, and so on; the force, in short, instead of varying by insensible changes, is supposed to act by a series of fits and starts. This must be what Archdeacon Pratt means when he talks of "a succession of slight horizontal pushes being given to the poles." The amount of motion produced during each interval on the above supposition is then determined, and these amounts are added together to obtain the displacement produced.

It is clear enough that such a method can only be approximately correct; but it is also clear that the smaller each interval is, the nearer will the hypothetical be to the real state of the case, and the nearer will the calculated be to the actual result. As long as the intervals are finite there must be some error, but the smaller the intervals are made the less will this error be. I need not go into the methods of mathematical analysis which enable us to get rid of this error, and which, when we have found out what will be the effects of a force acting with variable intensity by fits and starts separated by small finite intervals, enables us to deduce the effect of the same force when it comes to vary incessantly; for I hope I have made clear the nature of the mathematical artifice on which this analysis is founded.

Now it seems to me that Archdeacon Pratt all along reasons on the supposition that the moon's attraction acts after the manner the mathematical artifice I have described supposes it

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